ENVIRONMENTAL TEST EVALUATION

OF TEN TYPES OF MODIFIED APOLLO STANDARD INITIATORS

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INTRODUCTION

The purpose of this series of tests was to determine the basic characteristics of several types of modified Apollo Standard Initiators, designated as Product Improvement Program (PIP) initiators, including the effects of vibration, thermal shock, electrostatic shock, and high and low temperature on electrical and firing characteristics.

Each PIP initiator represented a single change in the normal construction of the Apollo Standard Initiator (ASI). Several of the changes represented "mistakes" which could be committed during the fabrication of the ASI. The knowledge of the electrical and firing characteristics of these and the other PIP initiators evaluated during this test program should be valuable in maintaining the quality control of the current ASI and for designing future improvements on its basic configuration.

The test program was conducted by the Pyrotechnics Test Section of the Thermochemical Test Branch at the Pyrotechnics Test Facility, Building 352, in accordance with a request from the Auxiliary Propulsion and Pyrotechnics Branch, Propulsion and Power Division. The test was conducted during the period from December 14, 1965 to February 10, 1966.

TEST ARTICLE DESCRIPTION

The Apollo Standard Initiator (ASI), North American Aviation Part No. ME 453-0009, is a standardized "hot-wire" initiator of minimal size and weight containing two independent bridge wire circuits (4 pins) which will withstand passage of 1 amp or 1 watt through each bridgewire (simultaneously) and an electrostatic discharge of 9000 volts from a 500 picofarad (pf) capacitor from the pins (shorted together) to the case. The Apollo Standard Initiator is used as an independent pressure cartridge to function small mechanical devices, such as explosive valves, and also as a basic module for higher level hermetically sealed pyrotechnic assemblies which perform a variety of functions. The component parts of the Apollo Standard Initiator are shown in Figure 1.

The Product Improvement Program (PIP) initiators evaluated during this test program were special non-flight articles with the same basic configuration as the ASI but with certain built-in defects or changes. Ten types of PIP initiators were tested, each with one (single) change from the basic ASI. Figure 2 outlines and illustrates the changes to the basic ASI. A summary description of each modification is outlined below:

PIP - 1 Tophet A, a metal similar to Nichrome, is substituted for the standard bridgewire material, Nilstain.

PIP - 2 An isomica disk is placed between the ignition charge and the bridgewire.

PIP - 3 A third bridgewire is placed between pins B and C.

PIP - 4 The bridgewire between pins A and B is bent slightly toward the bridgewire between pins C and D. The bend adds approximately 25% to the normal length of the bridgewire.

PIP - 5 Graphite, which represents approximately 1% by weight of the initiator mix of the normal ASI, is eliminated.

PIP - 6 The initiation charge is compacted to 5,000 psi as compared to 10,000 psi in the normal ASI.

PIP - 7 The ceramic header is cracked between bridgewires A-B and C-D.

PIP - 8 Bridgewire A-B only is present; pins C and D are covered with insulation.

PIP - 9 No isomica disks are placed in the initiator.

PIP - 10 Viton B, a fluoroelastomer which represents approximately 5% by weight of the pyrotechnic mix of the normal ASI, is eliminated.

These initiators were manufactured by Space Ordnance Systems, El Segundo, California, for the sole purpose of product improvement testing and were carefully identified as non-flight hardware.

TEST EQUIPMENT DESCRIPTION

The major environmental equipment and measuring instruments used in this program and a brief description of each are listed below:

Universal Electroexplosive Initiator Test Set, FILUP-2 - This is a custom-built system of instrumentation for evaluation of electroexplosive devices. It incorporates in one integrated system the capabilities for evaluation testing of all types of electroexplosive initiators including; hot wire bridge types, carbon bridge, exploding bridgewires, conductive mix, and spark gap. Specifically, the test set incorporates the features of three separate systems for the evaluation of the performance of electroexplosive initiators. These systems are:

a. Universal Pulser - This system provides constant current and constant voltage pulses ranging in amplitude from milliamperes to tens of amperes and pulse times ranging from one microsecond to hours.

b. Exploding Bridgewire Test Set - Using voltages of up to 6,000 volts and capacitors of 1, 2 and 10 microfarads this test set provides a wide range of capability in the testing of exploding bridgewires.

c. Capacitor Discharge Test Set - Using capacitors from 0.001 to 10 microfarads, this system provides the capability for capacitor discharge testing of conventional initiators, carbon bridge, hot wire bridge, conductive mix and spark gap types.

General Radio Model 1862-C Megohmeter - This is a standard megohmeter with selectable test voltages of 100 and 500 volts. The usable range of the instrument is from 0.5 to 2,000,000 megohms.

Static Discharge Tester - This instrument charges a capacitor to a set voltage and subsequently discharges into the test article through a vacuum relay. This unit can charge the capacitor to any voltage up to 30,000 volts. A 500 pf capacitor was used in these tests.

Boonton Model 75A Capacitance Bridge - With a built-in 1 megacycle (Mc) test oscillator this unit is capable of measuring capacitances from 0.0002 to 1000 pf.

Missimers Model FT1.5 Bench Type Temperature Test Chamber - This chamber is a small, mechanically refrigerated temperature chamber providing a temperature range of minus 100 to plus 350 degrees F.

MB Electronics Vibration System - This system is capable of sine or random vibration modes with a frequency range of 5 to 3000 cycles per second and a transmitted force of 4500 pounds.

Closed Bomb, Transducer, Charge Amplifier - Pressures in the 10 cc closed bomb manufactured by Space Ordnance Systems were measured using a Kistler Model 617L piezoelectric transducer and Kistler Model 568 Charge Amplifier.

Other standard electronic laboratory equipment such as voltmeters and ohmmeters were used as required in setting up and performing the various tests.

TEST PROCEDURE

The first step in the program was to collect baseline data on each initiator to provide information from which the effects of the various environments on the PIP units could be evaluated. The electrical parameters listed below were measured and recorded for each initiator.

a. Bridgewire resistance (AB,CD)

b. Insulation resistance, pins to case @ 500 volts DC.

c. Interbridge resistance, @ 1½ volts DC.

d. Capacitance, pins to case.

e. Interbridge capacitance.

Electrical parameters (c) and (e), interbridge reistance and interbridge capacitance were omitted for all Type 3 PIP's since these PIP units incorporated the third bridgewire between pins B and C and would fire if the voltage necessary to measure these parameters was applied across the third bridgewire.

The electrical parameter measurements were made on twenty initiators from each of the ten PIP types. The 200 initiators were then divided into three groups, A, B and C. Group A included five (5) initiators of each PIP type, Group B included ten (10) initiators of each PIP type, and Group C included five (5) initiators of each PIP type.

Each initiator taken one at a time from Group A was subjected to an electrostatic discharge (between the pins shorted together and the case) from a 500 picofarad capacitor charged to 1000 volts. After the initial discharge, the discharge voltage was increased in steps of 1000 volts until the initiator fired or until the maximum voltage capability of the test equipment was attained (30,000 volts). After each pulse, the initiator's interbridge resistance and interbridge capacitance were measured and recorded for comparison with the baseline electrical data.

With the exception of the Type 3 PIP's, the Group A units which did not fire when subjected to the electrostatic discharge were then tested to determine the minimum voltage, applied bridgewire to bridgewire, necessary to cause ignition. Each initiator was subjected to 10 volts, applied bridgewire to bridgewire, for a period of 5 seconds. The voltage was then increased in steps of 10 volts until the initiator fired.

Within five minutes after firing an initiator in any of the tests, the leakage current was measured and recorded with 28 volts DC applied between the points listed below:

a. Pin A to Pin B

b. Pin C to Pin D

c. Shorted pins A-B to shorted pins C-D.

d. All pins shorted together and the case.

The initiators of Group B were subjected to random vibration in each of their three orthogonal axes at levels of 0.01 g^2/cps at 10 cps with a 6 db/octave increase to 0.8 g^2/cps at 100 cps, then constant at 0.8 g^2/cps from 100 cps to 400 cps and a 3 db/octave decrease from 400 cps to 0.16 g^2/cps at 2000 cps.

The vibration was applied for a period of five minutes per axis. Within 30 minutes after the completion of the vibration test, the interbridge resistance and interbridge capacitance of each initiator of Group B, with the exception of Type 3 PIP's were measured and recorded for comparison with the baseline electrical data.

Following these measurements, each initiator of Group B was subjected to a current of one ampere through each of its bridgewires for a period of five minutes. For all PIP types other than type 3 (three bridgewires) and 8 (one bridgewire) the current was applied to both bridgewires simultaneously. Type 3 initiators were tested by applying the one ampere current through bridgewires A-B and C-D simultaneously for five minutes and then the current was applied through bridgewire B-C separately for five minutes.

Group B was then divided into subgroups B_1 and B_2. Each of these subgroups was composed of five initiators of each PIP type for a total of 50 initiators per subgroup.

Each initiator of subgroup B_1 was then fired in a 10 cc closed bomb by applying a current of five amperes to only one bridgewire of each initiator. The initiators, the 10 cc closed bombs, and the pressure measuring transducers were stabilized before firing at a temperature of minus 300 $^{+5}_{-20}$ degrees F. Data was recorded during each firing from which the time to fire, time to peak pressure, and peak pressure was measured.

Each initiator of subgroup B_2 was then fired in a 10 cc closed bomb by applying a current of 3.5 amperes to one bridgewire of each initiator. The initiators, the 10 cc closed bombs, and the pressure transducers were stabilized before firing at a temperature of plus 300 ±5 degrees F. Data was recorded during each firing from which the time to fire, time to peak pressure and peak pressure was measured.

Each initiator of Group C was subjected to ten temperature cycles. Each cycle was conducted with the initiator temperature stabilized at minus 300 $^{+5}_{-20}$ degrees F for one hour followed by one-half hour at plus 300±5 degrees F. The time of transfer between each temperature chamber did not exceed one minute. At the end of the tenth cycle the initiators were allowed to return to ambient temperature and then, with the exception of the Type 3 PIP's, interbridge resistances and interbridge capacitances were measured and recorded for comparison with the baseline data.

Each initiator of Group C was then fired in a 10 cc closed bomb by applying a current of 3.5 amperes to one bridgewire of each initiator. Data was recorded during each firing from which the time to fire, time to peak pressure, and peak pressure was measured.

RESULTS AND DISCUSSION

Baseline Parameters

The tabulated initial electrical parameters from groups A, B, and C (see tables 1, 2, and 3) show no abnormalities, other than those expected, from the electrical parameters of the Apollo Standard Initiator. The expected deviations appeared in the following PIP types of groups A, B, and C.

a. PIP 3 - The third bridgewire between pins B and C showed a resistance comparable to AB and CD bridgewires. No attempt was made to measure the interbridge resistance or interbridge capacitance on the Type 3 PIP initiator because the voltage necessary to make the measurement, when placed across this third bridgewire, would fire the initiator.

b. PIP 4 - Due to the increased length of bridgewire AB, the AB bridgewire resistance was approximately 30% higher than normal.

c. PIP 8 - In all cases bridgewire CD was not present.

Electrostatic Discharge

When exposed to the electrostatic discharge test, three PIP types appeared to be especially sensitive, (see table 1). Four of the five initiators of PIP Types 1, 7, and 9 fired when exposed to repeated static discharges.

PIP Type 9 appear to be the most sensitive. This is probably due to the absence of the isomica disks which, with the ceramic header, insulate the ignition charge from the electrically conductive main charge and the case (see figure 1). The absence of these disks leaves an electrically conductive path between the pins and bridgewire, and the case. Hence, any static discharge applied between the initiator's case and pins conducts through the mix.

PIP Type 7 is also sensitive to the static discharge because the static charge has a discharge path from the pins, through the mix, through the cracked header and back to the case.

PIP Type 1, with the Tophet A bridgewire, was also found to be sensitive to static discharge. No apparent reason is evident as to why this initiator should be especially sensitive to the static discharge since both the isomica disks and the ceramic header are in place and undamaged. It is possible that the change in bridgewire size could be the cause of the increased sensitivity.

For all PIP types, with each repetition of the static voltage discharge, the initiators' interbridge resistances decreased and, in general, the interbridge capacitances increased. The following is an example (PIP Type 1, S/N 11):

Voltage Applied	Interbridge Resistance	Interbridge Capacitance
baseline	Above 1.5 K meg	2.249 pf
1000	Above 1.5 K meg	1.700 pf
2000	Above 1.5 K meg	2.884 pf
3000	15 meg	2.283 pf
4000	2.15 meg	3.456 pf
5000	50 K	3.772 pf
6000	16.6 K	4.533 pf
7000	6 K	4.325 pf
8000	6 K	3.960 pf
9000	3 K	4.063 pf
10000	2.5 K	4.088 pf
11000	2.5 K	4.386 pf
12000	2.14 K	4.380 pf
13000	2 K	4.348 pf
14000	Unit fired	

It appears that the electrostatic discharge generates a field which affects the initiator mix, causing it to become more conductive.

Minimum Ignition Voltage (Bridgewire to bridgewire)

In the determination of the minimum bridgewire to bridgewire ignition voltage the only abnormalities occurred with the PIP Type 2 and Type 8 initiators (see table 3). Neither type initiator fired with up to 1500 volts applied. bridgewire to bridgewire. As expected, the Type 2 initiators would not fire in this mode because the isomica disk over the bridgewires separated the ignition mix from the path of the leakage current between the two bridgewires. Also, as expected, the Type 8 PIP's did not fire because the CD bridgewire was purposely absent and there was insulation over the C and D pins.

The other PIP initiators fired at approximately 135 volts. This figure may be somewhat deceptive in that it has been found from past programs that the ASI becomes more sensitive to voltages applied, bridgewire to bridgewire, with each successive application, i.e., the ASI will withstand a much higher voltage application if only one pulse is applied.

Vibration (Mission Maximum Level)

Previous test programs conducted on Apollo initiators have shown that vibration at the mission maximum level causes the initiators' interbridge resistances to increase and interbridge capacitances to decrease. The mission maximum vibration level applied to the PIP units in this test program also caused a

50 to 67% decrease in the interbridge capacitance of every type of PIP initiator. In every case the PIPs' interbridge resistances remained above 1.5 K megohms - (see table 2).

One amp - No Fire Test

None of the changes made to the initiators for this PIP test program made them more than normally sensitive to the one ampere no fire test. None of the units fired or showed appreciable signs of degradation as a result of one ampere of current through both bridgewires for five minutes.

Temperature Cycling

After temperature cycling every PIP unit showed a decrease of about 20 to 50% of the initial interbridge capacitance. The interbridge resistance in every case remained above 1.5 K megohms.

Again, as has been encountered in previous temperature cycling tests on Apollo initiators, the end closures on a number of the units bulged quite noticeably. This bulging is apparently due to a build-up of internal pressure. PIP Types 2, 9, and 10 appeared to be especially affected by the temperature cycling. Four of the five units of each of these three type initiators showed expanded end closures. One unit of the Type 10 initiators, which showed the greatest end closure expansion, was carefully cut open on a lathe in an effort to determine if any visual changes had occurred in the mix to cause the bulging. No visual changes were noted.

Type 3 and 7 PIP initiators showed no bulging of the end closures. PIP Type 7, with the cracked header, would necessarily not allow any buildup of internal pressure. No apparent reason has been determined for the lack of bulging in the PIP Type 3 initiator.

Closed Bomb Firing

There appears to be little difference between the peak pressures produced by the PIP units fired at plus 300 degrees F, those fired at minus 300 degrees F, and those fired at ambient temperature. However, there was a large number of units which produced peak pressures outside the range of the lot acceptance specifications (650 $\pm$ 125 psi). Of the 149 initiators fired in the closed bomb, 26 did not meet the pressure specifications for lot acceptance.

None of the PIP initiators showed any outstanding increase or decrease from normal peak pressure output with the exception of the Type 2 units. None of the Type 2 units fired in these tests due to the isomica disks separating the bridgewires from the ignition mix.

The time to fire data shows only one abnormality. In almost every case the PIP Type 1 units took from 2 to 3 times longer to fire than the other units (see tables 2 and 3). This is probably caused by the Tophet A bridgewire. Tophet A has a higher resistivity than the normal bridgewire material and, to keep the bridgewire resistance close to one ohm, the Tophet A bridgewire must have a greater diameter. Therefore, the Tophet A bridgewire has a larger

surface area from which to conduct the heat generated by the firing current and thus does not heat to the ignition temperature of the mix as rapidly as the normal bridgewire.

CONCLUSIONS

1. All PIP initiators with the exception of Type 2 are electrostatic sensitive. Initiator Types 1, 7, and 9 appear to be especially sensitive to electrostatic discharge.

2. None of the PIP initiators, with the exception of Types 2 and 8, are more or less sensitive to voltages applied bridgewire to bridgewire than the Apollo Standard Initiator.

3. Vibration at the mission maximum level does not adversely affect the PIP initiators.

4. None of the PIP initiators are more than normally sensitive to the one amp-no fire test.

5. During temperature cycling all PIP initiators, with the exception of Types 3 and 7, appear to develop internal pressures which cause bulged end closures.

6. The PIP Type 2 initiator will not fire in any of the modes encountered in this series of tests.

7. An abnormally large number of the PIP units produced peak pressures outside the range of the lot acceptance specifications for the Apollo Standard Initiator. These unacceptable pressures were not limited to one PIP initiator type.

8. Temperature has little or no effect on the peak pressures developed by the PIP initiators fired in a 10 cc closed bomb.

9. The use of bridgewire material of greater resistivity (and thus greater diameter) in the Type 1 initiators increased the ignition delay two (2) to three (3) times. This is considered to be due to the longer time required to bring the bridgewire and explosion mix to ignition temperature.

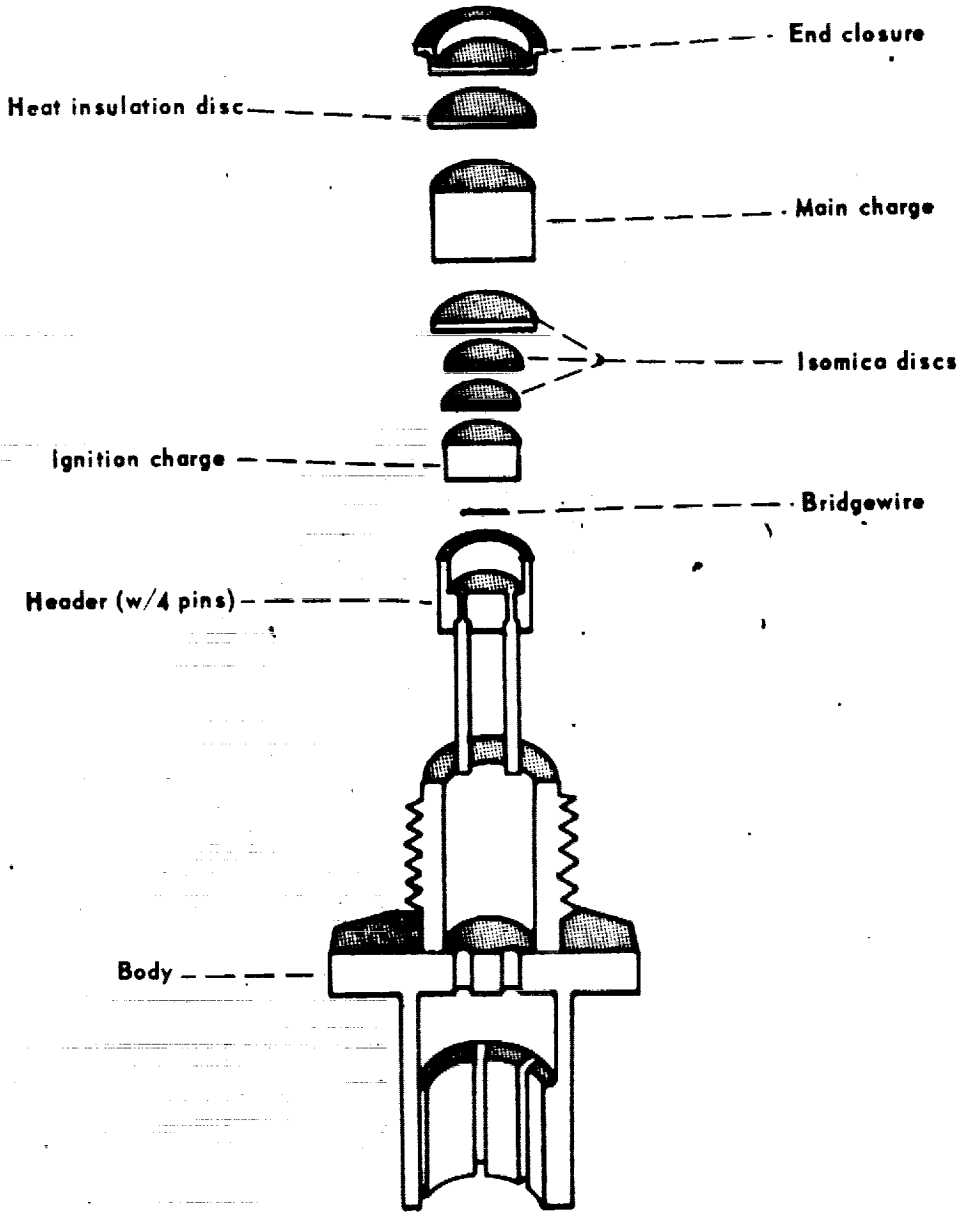


Figure 1 Construction of the Apollo standard initiator

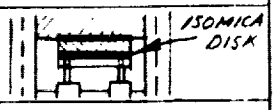
PIP DASH NO.	DEGRADATION	EXAMPLE
1	Tophet A bridgewire	
2	Isomica disk on top of bridgewires	
3	Third bridgewire between B-C	
4	A-B bridgewire bent toward C-D bridgewire approx. 25% longer than C-D	
5	No graphite in initiation mix	
6	Initiation charge compaction pressure 5000psi	
7	Header cracked between A-B and C-D bridges	
8	Bridgewire A-B only. C-D covered with insulation	
9	No isomica disks	
10	Initiation mix minus binder	

FIGURE 2 - PIP CONFIGURATIONS

APPENDIX

TABULATED DATA

TEST GROUP A

PIP TYPE	S/N	[illegible] PARAMETERS: INTERFERENCE RES.	INTERFERENCE CAPAC.	BRIDGEWIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	BRIDGEWIRE TO BRIDGEWIRE FIRING VOLTAGE - VOLTS	[illegible] VOLTAGE LEVEL - VOLTS
1	11	Above 1.5 K meg	2.249pf	AB 1.018 CD 1.024	1000 K meg	8.21 pf	-	14,000
1	35	"	1.571pf	AB 1.030 CD 1.094	2 K meg	8.77pf	-	2,000
1	34	"	2.304pf	AB 1.065 CD 1.072	500 K meg	5.37pf	-	3,000
1	24	"	2.202pf	AB .990 CD 1.068	5 K meg	5.18pf	-	4,000
1	19	"	2.252pf	AB 1.059 CD .981	50 K meg	5.47pf	150	No fire to 30,000 volts
2	20	"	1.510pf	AB .957 CD 1.002	600 K meg	8.43pf	No fire	"
2	25	"	1.519pf	AB .991 CD 1.011	700 K meg	8.13pf	"	"
2	24	"	1.537pf	AB 1.087 CD 1.076	1000 K meg	8.54pf	"	"
2	02	"	1.529pf	AB 1.068 CD 1.065	700 K meg	8.26pf	"	"
3	07	"	1.493pf	AB 1.111 CD 1.059	1200 K meg	7.97pf	"	"
3	13	N/A	N/A	AB 1.049 BC 1.033 CD .980	700 K meg	8.87pf	N/A	"

TABLE 1

TABULATED DATA

TEST GROUP 1

PIP TYPE	S/N	INITIAL PARAMETERS						
		INTERBRIDGE RES.	INTERBRIDGE CAPAC.	BRIDGEWIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	BRIDGEWIRE TO BRIDGEWIRE FIRING VOLTAGE - VOLTS	ELECTROSTATIC VOLTAGE FIRING LEVEL (Volts)
3	12	N/A	N/A	AB .954 BC 1.049 CD 1.018	500 K meg	8.77pf	-	20,000
3	15	"	"	AB 1.033 BC 1.043 CD 1.014	50 K meg	9.01pf	N/A	No fire to to 30,000 volts
3	16	"	"	AB .997 BC 1.032 CD 1.000	500 K meg	4.92pf	N/A	"
3	25	"	"	AB 1.054 BC 1.090 CD .943	1000 K meg	5.37pf	-	4,000
4	11	Above 1.5 K meg	1.615pf	AB 1.319 CD 1.014	800 K meg	8.90pf	-	18,000
4	12	"	1.617pf	AB 1.402 CD 1.070	600 K meg	8.36pf	120	No fire to 30,000 volts
4	01	"	1.673pf	AB1.245 CD 1.037	500 K meg	8.89pf	-	4,000
4	22	"	1.552pf	AB 1.431 CD 1.024	500 K meg	8.33pf	150	No fire to 30,000 volts
4	06	"	2.286pf	AB 1.309 CD 1.034	1000 K meg	5.28pf	120	"
5	28	"	1.538	AB 1.070 CD 1.030	500 K meg	7.97pf	-	14,000
5	26	"	1.555pf	AB 1.071 CD 1.044	800 K meg	8.15pf	-	17,000

TABULATED DATA

TEST GROUP 1

PIP TYPE	S/N	ELECTRICAL PARAMETERS					BRIDGEWIRE TO BRIDGEWIRE FIRING VOLTAGE - VOLTS	ELECTROSTATIC VOLTAGE FIRING LEVEL (Volts)
		INTERBRIDGE RES.	INTERBRIDGE CAPAC.	BRIDGEWIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.		
5	11	Above 1.5 K meg	1.588 pf	AB 1.050 CD 1.031	800 K meg	8.35pf	150	No fire to 30,000 volts
5	17	"	2.373pf	AB 1.027 CD .960	35 K meg	5.46pf	-	26,000
5	27	"	1.547pf	AB 1.120 CD 1.104	600 K meg	8.53pf	150	No fire to 30,000 volts
6	24	"	1.552pf	AB 1.028 CD 1.004	200 K meg	8.63pf	110	"
6	22	"	1.587pf	AB 1.001 CD 1.042	500 K meg	8.45pf	130	"
6	23	"	1.622pf	AB .978 CD 1.048	500 K meg	9.02pf	70	"
6	01	"	1.581pf	AB .957 CD 1.030	200 K meg	8.86pf	140	"
6	31	"	1.584pf	AB 1.010 CD 1.022	700 K meg	8.81pf		2,000
7	19	"	1.555pf	AB 1.011 CD 1.015	700 K meg	8.72pf	-	2,000
7	29	"	2.333pf	AB 1.032 CD 1.006	200 K meg	9.13pf	-	12,000
7	26		2.349pf	AB 1.025 CD 1.048	250 K meg	5.38pf	-	6,000

TABULATED DATA

TEST GROUP A

PIP TYPE	S/N	ENTIRE PARAMETERS: INTERBRIDGE RES.	INTERBRIDGE CAPAC.	BRIDGEWIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	BRIDGEWIRE TO BRIDGEWIRE FIRING VOLTAGE - VOLTS	ELECTROSTATIC VOLTAGE FIRING LEVEL (Volts)
7	31	Above 1.5 K meg	2.316pf	AB 1.047 CD 1.014	500 K meg	5.71pf	130	No fire to 30,000 volts
7	33	"	1.515pf	AB 1.024 CD 1.047	600 K meg	5.26pf	-	10,000
8	13	"	1.527pf	AB 1.015	500 K meg	5.20 pf	No fire	No fire to 30,000 volts
8	08	"	1.510pf	AB 1.089	600 K. meg	8.87pf		27,000
8	27	"	1.600 pf	AB 1.035	800 K meg	9.64pf	No fire	No fire to 30,000 volts
8	32	"	1.519 pf	AB 1.048	350 K meg	8.76pf		18,000
8	26	"	1.713 pf	AB 1.030	450 K meg	6.10pf	No fire	No fire to 30,000 volts
9	15	"	1.578 pf	AB 1.042 CD 1.059	700 K meg	8.66pf	-	6,000
9	25	"	1.606 pf	AB 1.000 CD 1.050	500 K meg	5.16pf	-	2,000
9	05	"	1.604 pf	AB .963 CD 1.029	600 K meg	9.06pf	-	2,000
9	26	"	1.598pf	AB 1.045 CD 1.131	1.6 Kmeg	9.18pf	-	2,000

TABULATED DATA

TEST GROUP A

PIP TYPE	S/N	INITIAL PARAMETERS					BRIDGEWIRE TO BRIDGEWIRE FIRING VOLTAGE - VOLTS	ELECTROSTATIC VOLTAGE FIRING LEVEL (Volts)
		INTERBRIDGE RES.	INTERBRIDGE CAPAC.	BRIDGEWIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.		
9	13	Above 1.5 K meg	1.578 pf	AB 1.069 CD 1.092	500 K meg	8.99 pf	130	No fire to 30,000 volts
10	07	"	1.565 pf	AB .988 CD .977	300 K meg	8.71 pf	120	"
10	16	"	1.583 pf	AB .980 CD 1.056	10 K meg	5.50 pf		2,000
10	23	"	1.539 pf	AB 1.065 CD 1.049	600 K meg	8.92pf		2,000
10	28	"	1.572 pf	AB 1.006 CD 1.057	500 K meg	8.97 pf		3,000
10	29	"	2.184 pf	AB 1.066 CD 1.020	350 K meg	5.52 pf	140	No fire to 30,000 volts

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi
B1	1	12	Above 1.5 Kmeg	1.606pf	A-B .957 C-D1.047	800 Kmeg	8.74pf	Above 1.5 Kmeg	.516pf	1.50	708
"	1	17	"	2.403pf	A-B1.060 C-D1.036	800 Kmeg	5.41pf	"	.462pf	1.34	688
"	1	22	"	1.566pf	A-B1.022 C-D1.004	700 Kmeg	8.52pf	"	.539pf	3.29	657
"	1	26	"	1.555pf	A-B .988 C-D1.002	600 Kmeg	8.47pf	"	.407pf	3.49	703
"	1	32	"	2.266pf	A-B1.012 C-D .976	1000 Kmeg	5.18pf	"	1.297pf	1.46	668
"	2	11	"	1.539pf	A-B1.066 C-D1.064	700 Kmeg	8.33pf	"	.396pf	no fire	-
"	2	19	"	2.246pf	A-B1.039 C-D .994	600 Kmeg	5.33pf	"	1.205pf	no fire	-
"	2	21	"	1.526pf	A-B1.087 C-D1.041	800 Kmeg	8.22pf	"	.403pf	no fire	-
"	2	22	"	1.516pf	A-B1.065 C-D1.073	800 Kmeg	8.28pf	"	.534pf	no fire	-
"	2	26	"	1.528pf	A-B .996 C-D1.030	800 Kmeg	8.24pf	"	.406pf	no fire	-
"	3	03	N/A	N/A	AB1.064 BC1.048 CD1.078	200 Kmeg	8.99pf	N/A	N/A	1.93	649
"	3	06	N/A	N/A	AB1.029 BC .977 CD1.064	1000 Kmeg	5.53pf	N/A	N/A	1.72	399

TABLE 2

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE .RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi)
B1	3	09	N/A	N/A	AB1.010 BC .975 CD1.031	1000 K meg	8.88pf	N/A	N/A	1.73	609
"	3	10	"	"	AB1.055 BC1.106 CD1.000	2 K meg	8.11pf	"	"	1.79	506
"	3	14	"	"	AB1.131 BC1.078 CD1.100	900 Kmeg	8.46pf	"	"	1.29	692
"	4	04	Above 1.5 Kmeg	1.532pf	AB1.220 CD1.025	1800 K meg	8.50pf	Above 1.5 Kmeg	1.2pf	1.44	391
"	4	07	"	1.599pf	AB1.355 CD1.048	1500 K meg	7.92pf	"	.581pf	1.64	647
"	4	08	"	1.617pf	AB1.279 CD1.021	1800 K meg	8.56 pf	"	.580pf	1.66	591
"	4	13	"	1.585pf	AB1.346 CD1.073	1000 K meg	8.42pf	"	.534pf	1.17	632
"	4	28	"	1.602pf	AB1.276 CD1.000	1000 Kmeg	8.85pf	"	.606pf	1.46	816
"	5	02	Above 1.5 Kmeg	1.532pf	AB1.016 CD .898	1200 K meg	8.33pf	"	.325pf	1.62	679
"	5	08	"	1.529pf	AB1.005 CD1.055	1000 K meg	8.07pf	"	.545pf	1.70	728
"	5	13	"	1.547pf	AB1.120 CD1.103	1300 K meg	8.80pf	"	.426pf	1.71	290
"	5	16	"	1.547pf	AB1.104 CD1.037	600 K meg	8.29pf	"	.336pf	2.21	382

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE psi
B1	5	19	Above 1.5 Kmeg	1.536pf	AB1.105 CD1.037	1600 K meg	8.55 pf	Above 1.5 Kmeg	.353pf	1.79	457
"	6	11	"	1.581pf	AB1.073 CD1.092	1500 K meg	8.90 pf	"	.493pf	1.32	691
"	6	12	"	1.585pf	AB .993 CD1.037	20 K meg	8.96pf	"	.463pf	1.69	625
"	6	15	"	1.576pf	AB .982 CD1.015	2000 K meg	9.19pf	"	.466pf	1.56	643
"	6	16	"	1.603pf	AB1.022 CD1.015	1500 K meg	5.38pf	"	.648pf	1.19	702
"	6	17	"	1.585pf	AB .992 CD1.025	2000 K meg	8.44pf	"	.484pf	1.46	406
"	7	10	"	1.570pf	AB1.084 CD1.030	2000 K meg	9.02pf.	"	1.325pf	1.21	684
"	7	11	"	1.566pf	AB1.037 CD1.048	250 K meg	8.51pf	"	.533pf	1.60	671
"	7	14	"	1.586pf	AB1.045 CD1.015	300 K meg	9.14pf	"	.523pf	1.36	702
"	7	16	"	1.552pf	AB1.033 CD1.000	2000 K meg	8.74pf	"	.457pf	1.47	457
"	7	21	"	1.577pf	AB1.049 CD1.015	2000 K meg	8.66pf	"	.508pf	1.52	717
"	8	12	"	1.583pf	AB1.027 CD N/A	∞	8.78pf	"	.374	1.76	686

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES..	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi)
B1	8	18	Above 1.5 Kmeg	1.586pf	AB .994 CD N/A	2000 K meg	9.02pf	Above 1.5 Kmeg	.370pf	1.50	658
"	8	19	"	1.594pf	AB1.017 CD N/A	2000 K meg	8.23pf	"	.395pf	1.56	599
"	8	24	"	1.626pf	AB1.010 CD N/A	1500 K meg	8.82pf	"	.385pf	1.23	423
"	8	25	"	1.573pf	AB1.044 CD N/A	2000 K meg	8.98pf	"	.376pf	1.21	605
"	9	16	"	1.622pf	AB1.098 CD1.078	∞	9.06pf	"	.531pf	2.75	595
"	9	21	"	1.587pf	AB1.053 CD1.100	150 K meg	5.50pf	"	1.246pf	1.70	628
"	9	24	"	2.411pf	AB1.045 CD1.019	∞	5.36pf	"	1.133pf	1.70	608
"	9	30	"	1.598pf	AB1.042 CD .965	∞	6.62pf	"	.490pf	1.85	554
"	9	31	"	1.594pf	AB1.025 CD1.063	2000 K meg	8.68pf	"	.467pf	2.34	671
"	10	19	"	2.399pf	AB1.014 CD1.016	∞	8.49pf	"	1.170pf	1.42	547
"	10	20	"	1.488pf	AB .958 CD .995	500 K meg	5.88pf	"	.323pf	1.32	691
"	10	21	"	1.574pf	AB1.067 CD1.097	∞	8.90pf	"	.378pf	1.55	747

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi)
B1	10	22	Above 1.5Kmeg	1.546pf	AB1.048 CD1.114	2000 K meg	8.96pf	Above 1.5Kmeg	1.025pf	1.71	646
"	10	27	"	1.532pf	AB1.019 CD1.091	1500 K meg	9.04pf	"	.354pf	1.17	706
B2	1	01	"	1.580pf	AB1.002 CD1.017	∞	8.23pf	"	1.130pf	-	406
"	1	06	"	1.572pf	AB1.050 CD1.014	∞	5.34pf	"	.434pf	-	627
"	1	08	"	2.309pf	AB1.012 CD1.023	∞	8.74pf	"	1.194pf	-	480
"	1	13	"	1.572pf	AB1.023 CD .971	2000 K meg	8.93pf	"	1.414pf	-	638
"	1	33	"	2.242pf	AB .986 CD1.021	2000 K meg	8.76pf	"	.410pf	-	655
"	2	13	"	1.536pf	AB1.074 CD1.020	2000 Kmeg	8.25pf	"	.343pf	No fire	-
"	2	16	"	2.092pf	AB1.043 CD1.046	1500 K meg	5.15pf	"	.890pf	"	-
"	2	23	"	1.529pf	AB .989 CD .993	1500 K meg	8.33pf	"	.353pf	"	-
"	2	27	"	1.524pf	AB1.033 CD .969	700 K meg	8.24pf	"	.343pf	"	-
"	2	28	"	1.530pf	AB1.017 CD .991	1500 K meg	7.86pf	"	.350pf	"	-

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi)
B2	3	05	N/A	N/A	AB1.134 BC .981 CD1.145	1500 Kmeg	8.53pf	N/A	N/A	2.03	393
"	3	11	"	"	AB1.043 BC1.120 CD1.091	2000 K meg	5.48pf	"	"	2.70	450
"	3	19	"	"	AB1.025 BC1.090 CD1.034	2000 K meg	8.68pf	"	"	2.15	496
"	3	20	"	"	AB1.089 BC1.097 CD1.137	1200 K meg	8.70pf	"	"	2.14	561
"	3	26	"	"	AB1.042 BC1.078 CD1.032	1000 K meg	8.82pf	"	"	12.63	443
"	4	20	Above 1.5K meg	1.620pf	AB1.333 CD1.001	400 K meg	8.30pf	Above 1.5K meg	1.271pf	10.33	728
"	4	25	"	1.511pf	AB1.278 CD1.114	700 K meg	9.46pf	"	1.223pf	1.93	567
"	4	26	"	1.637pf	AB1.271 CD1.040	400 K meg	8.97pf	"	.589pf	1.73	584
"	4	27	"	2.303pf	AB1.414 CD .985	2000 K meg	5.02pf	"	.566pf	2.53	567
"	4	29	"	1.621pf	AB1.281 CD1.020	40 K meg	8.51pf	"	.552pf	2.40	617
"	5	06	"	1.555pf	AB1.062 CD1.107	∞	8.18pf	"	.480pf	2.04	593
"	5	07	"	1.539pf	AB1.108 CD1.132	2000 K meg	8.39pf	"	.436pf	2.65	538

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE psi
B2	5	09	Above 1.5Kmeg	1.595pf	AB1.069 CD1.084	1000 K meg	8.61pf	Above 1.5Kmeg	.514pf	2.70	323
"	5	20	"	1.582pf	AB1.025 CD1.094	2000 K meg	8.22pf	"	.516pf	3.09	558
"	5	23	"	1.624pf	AB1.092 CD1.089	2000 K meg	8.61 pf	750meg	.466pf	2.73	563
"	6	03	"	2.443pf	AB1.102 CD1.108	1500 K meg	5.30pf	Above 1.5 Kmeg	1.237pf	2.10	635
"	6	06	"	2.296pf	AB1.039 CD1.138	2000 K meg	8.45pf	"	.387pf	2.32	582
"	6	19	"	1.632pf	AB1.025 CD1.040	2000 K meg	8.40pf	"	.412pf	2.34	579
"	6	26	"	2.400pf	AB1.014 CD .996	2000 Kmeg	5.94pf	"	1.154pf	2.00	622
"	6	32	"	2.252pf	AB1.061 CD1.028	2000 K meg	5.59pf	"	1.125pf	1.89	624
"	7	04	"	2.200pf	AB1.088 CD1.107	1500 K meg	8.54pf	"	.526pf	1.97	594
"	7	09	"	2.234pf	AB1.070 CD1.060	1000 K meg	5.62pf	"	1.231pf	1.87	546
"	7	15	"	2.268pf	AB1.068 CD .991	1500 K meg	5.57pf	"	1.337pf	1.93	571
"	7	28	"	1.463pf	AB1.026 CD1.024	2000 K meg	5.52pf	"	.466pf	2.16	58

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi)
B2	7	34	Above 1.5 K meg	1.522pf	AB1.019 CD1.026	1500 K meg	5.70pf	Above 1.5 K meg	.549pf	2.03	599
"	8	02	"	1.658pf	AB1.060 CD -	1800 K meg	9.28pf	"	.428pf	1.93	471
"	8	11	"	1.470pf	AB .988 CD -	2000 K meg	8.46pf	"	1.116pf	1.95	559
"	8	17	"	1.520pf	AB .979 CD -	1500 K meg	8.72pf	"	.364pf	2.09	451
"	8	23	"	1.559pf	AB1.049 CD -	300 K meg	9.28pf	"	.392pf	1.95	644
"	8	34	"	2.062pf	AB1.040 CD -	80 meg	5.46pf	250 meg	.976pf	1.87	589
"	9	28	"	1.531pf	AB1.127 CD1.037	10 K meg	8.89pf	Above 1.5 K meg	.435pf	2.46	581
"	9	20	"	2.283pf	AB1.105 CD1.107	500 K meg	9.18pf	"	1.310pf	1.99	586
"	9	03	"	1.535pf	AB1.084 CD1.062	1500 K meg	8.69pf	"	.488pf	2.09	620
"	9	10	"	1.524pf	AB1.056 CD1.079	2000 K meg	8.72 pf	"	.479pf	2.16	542
"	9	01	"	1.521pf	AB1.026 CD1.042	2000 K meg	5.52pf	"	.461pf	1.90	610
"	10	04	"	1.471pf	AB1.014 CD1.025	800 K meg	8.98pf	"	.355pf	2.00	599

TABULATED DATA
TEST GROUP B

			INITIAL PARAMETERS					PARAMETERS AFTER VIBRATION		FIRING PARAMETERS	
SUB GROUP	PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi)
B2	10	05	Above 1.5Kmeg	1.427pf	AB1.034 CD1.046	2000 k meg	8.36pf	Above 1.5K meg	.313pf	2.09	594
"	10	06	"	1.454pf	AB1.020 CD1.036	2000 K meg	9.12pf	"	.290pf	2.04	548
"	10	11	"	1.494pf	AB .963 CD .990	∞	9.36pf	"	.325pf	2.02	865
"	10	12	"	1.444pf	AB1.016 CD1.070	15 K meg	8.62pf	"	.308pf	2.20	770

TABULATED DATA

TEST GROUP C

		INITIAL PARAMETERS					PARAMETERS FOLLOWING TEMPERATURE CYCLING		FIRING PARAMETERS	
PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTERBRIDGE RES.	INTERBRIDGE CAPAC.	TIME TO PEAK PRESSURE* (msec)	PEAK PRESSURE (psi)
1	07	Above 1.5 Kmg	1.497 pf	AB1.050 CD1.034	3 K meg	8.96 pf	Above 1.5 K Meg	.322 pf	6.43	563
1	25	"	1.511 pf	AB .971 CD1.027	500 K meg	8.34 pf	"	.372 pf	7.58	751
1	30	"	1.483 pf	AB .975 CD1.012	∞	8.87 pf	"	.372 pf	12.36	665
1	27	"	2.298 pf	AB1.053 CD 1.054	∞	8.80 pf	"	.370 pf	8.07	581
1	28	"	1.509 pf	AB1.022 CD1.042	1500 K meg	9.33 pf	"	.357 pf	14.86	647
2	12	"	1.474 pf	AB1.117 CD1.025	∞	8.37 pf	"	.346 pf	no fire	no fire
2	05	"	1.446 pf	AB .985 CD .985	1000 K meg	8.39 pf	"	.307 pf	"	"
2	10	"	1.446 pf	AB1.000 CD1.008	∞	7.97 pf	"	.330 pf	"	"
2	08	"	1.440 pf	AB1.006 CD1.042	500 K meg	8.34 pf	"	.304 pf	"	"
2	09	"	1.465 pf	AB .988 CD1.057	∞	8.18 pf	"	.926 pf	"	"
3	01	"	N/A	AB1.023 BC1.062 CD1.024	∞	9.26 pf	N/A	N/A	2.44	542
3	22	"	"	AB1.022 BC1.056 CD1.000	∞	8.90 pf	"	"	2.40	663

TABLE 3

TABULATED DATA

TEST GROUP C

		INITIAL PARAMETERS					PARAMETERS FOLLOWING TEMPERATURE CYCLING		FIRING PARAMETERS	
PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTERBRIDGE RES.	INTERBRIDGE CAPAC.	TIME TO PEAK PRESSURE* (msec.)	PEAK PRESSURE (psi)
3	28	N/A	N/A	AB 1.034 BC 1.084	∞	8.62 pf	N/A	N/A	2.44	634
3	17	"	"	AB 1.029 BC 1.091 CD 1.002	1000 K meg	8.36 pf	"	"	2.45	579
3	08	"	"	AB 1.060 BC 1.075 CD 1.071	1800 K meg	5.34 pf	"	"	2.18	576
4	05	Above 1.5 K meg	2.335 pf	AB 1.212 CD 1.019	∞	5.40 pf	Above 1.5 K meg	1.161 pf	2.27	642
4	14	"	1.499 pf	AB 1.272 CD 1.014	∞	8.01 pf	"	.362 pf	2.12	637
4	17	"	1.497 pf	AB 1.343 CD 1.118	∞	7.83 pf	"	.373 pf	1.82	637
4	10	"	1.543 pf	AB 1.251 CD 1.061	1500 K meg	6.06 pf	"	.398 pf	1.83	682
4	09	"	2.193	AB 1.272 CD 1.108	∞	8.08 pf	"	1.00 pf	2.00	632
5	25	"	1.491 pf	AB 1.009 CD 1.000	∞	8.60 pf	"	.379 pf	2.33	518
5	01	"	1.596 pf	AB 1.078 CD 1.105	200 K meg	8.78 pf	"	.397 pf	3.18	418
5	18	"	1.511 pf	AB 1.020 CD 1.002	15 K meg	8.51 pf	"	.378 pf	2.93	576
5	31	"	1.460 pf	AB 1.018 CD 1.009	130 K meg	8.40 pf	"	1.038 pf	2.12	518

TABULATED DATA

TEST GROUP C

		INITIAL PARAMETERS					PARAMETERS FOLLOWING TEMPERATURE CYCLING		FIRING PARAMETERS	
PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTERBRIDGE RES.	INTERBRIDGE CAPAC.	TIME TO PEAK PRESSURE* (msec)	PEAK PRESSURE (psi)
5	03	Above 1.5 K meg	1.490 pf	AB 1.024 CD 1.139	40 K meg	8.48 pf	Above 1.5 K meg	.376 pf	3.10	545
6	27	"	2.215 pf	AB .950 CD 1.032	∞	5.57 pf	"	.988 pf	2.69	637
6	28	"	1.530pf	AB 1.042 CD 1.089	∞	8.76 pf	"	.360 pf	2.12	608
6	25	"	1.563pf	AB 1.012 CD .997	1500 K meg	8.53 pf	"	.392 pf	2.19	561
6	20	"	1.531pf	AB 1.008 CD 1.037	∞	8.94 pf	"	.353 pf	2.21	592
6	30	"	1.515pf	AB 1.028 CD 1.018	∞	8.39 pf	"	.354 pf	2.13	603
7	20	"	2.203pf	AB 1.027 CD 1.095	∞	8.55pf	"	1.006 pf	2.18	503
7	22	"	2.192pf	AB .946 CD 1.026	∞	8.30 pf	"	.97 pf	2.30	595
7	25	"	1.502pf	AB 1.007 CD 1.030	∞	8.91 pf	"	.399 pf	2.61	674
7	27	"	2.231 pf	AB 1.025 CD 1.018	∞	8.98 pf	"	1.002 pf	2.08	676
7	32	"	2.230pf	AB .994 CD 1.014	∞	5.27 pf	"	1.044 pf	2.24	700
8	07	"	2.197 pf	AB 1.090	∞	5.11 pf	"	.849 pf	2.08	597

TABULATED DATA

TEST GROUP C

		INITIAL PARAMETERS					PARAMETERS FOLLOWING TEMPERATURE CYCLING		FIRING PARAMETERS	
PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTERBRIDGE RES.	INTERBRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec	PEAK PRESSURE (psi)
8	10	Above 1.5 Kmeg	1.543 pf	AB.977	∞	8.95 pf	Above 1.5 K meg	.303 pf	3.31	579
8	20	"	1.528pf	AB1.108	∞	8.88 pf	"	.311 pf	1.80	621
8	21	"	2.243pf	AB .963	∞	5.48pf	"	.331 pf	2.51	655
8	31	"	1.597pf	AB1.070	300 K meg	9.00 pf	"	.329pf	2.09	605
9	12	"	1.513pf	AB1.056 CD1.039	∞	8.66 pf	"	.356pf	2.39	539
9	14	"	2.340pf	AB1.011 CD1.030	700 K meg	5.28 pf	"	.386pf	2.51	597
9	22	"	2.310pf	AB1.002 CD1.057	∞	5.34 pf	"	1.080 pf	2.32	553
9	27	"	1.569pf	AB1.137 CD1.059	2000 K meg	8.70 pf	"	.406 pf	2.24	582
9	32	"	2.232pf	AB1.071 CD1.046	1000 K meg	5.48 pf	"	.994 pf	2.31	579
10	08	"	2.282pf	AB1.023 CD1.011	4 K meg	8.94 pf	"	1.10 pf	*	*
10	13	"	1.538pf	AB1.069 CD1.042	∞	9.12 pf	"	.363 pf	1.83	447
10	15	"	1.505pf	AB1.043 CD1.022	500 Kmeg	8.63 pf	"	.368 pf	2.06	529

*Cut open for inspection after temperature cycling.

TABULATED DATA

TEST GROUP C

		INITIAL PARAMETERS					PARAMETERS FOLLOWING TEMPERATURE CYCLING		FIRING PARAMETERS	
PIP TYPE	S/N	INTER-BRIDGE RES.	INTER-BRIDGE CAPAC.	BRIDGE WIRE RES.	PIN TO CASE RES.	PIN TO CASE CAPAC.	INTERBRIDGE RES.	INTERBRIDGE CAPAC.	TIME TO PEAK PRESSURE (msec)	PEAK PRESSURE (psi)
10	30	75Kmeg	1.649 pf	AB 1.010 CD 1.103	∞	9.38 pf	Above 1.5 K meg	.383 pf	2.00	521
10	32	Above 1.5 Kmeg	1.505 pf	AB 1.060 CD 1.018	∞	8.23 pf	"	.296 pf	2.35	629